

Chapter VII

MONITORING

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Section I

INTRODUCTION

The MDNR is responsible for conducting the ambient air monitoring program throughout the state of Missouri. This program includes a State and Local Air Monitoring Station (SLAMS) network of air monitors for carbon monoxide (CO), lead (Pb), ozone (O₃), particulate matter-10 micron (PM₁₀), particulate matter-2.5 micron (PM_{2.5}) and sulfur dioxide (SO₂). This network is designed to meet the EPA siting regulations and is reviewed annually.

All of the monitors and the laboratory analytical procedures being utilized in this SLAMS network are EPA designated reference or equivalent methods. The standard materials used to calibrate and audit the monitoring systems are properly certified and have the required certification to NIST reference standards.

The agency's standard operating procedures (SOP's) are in good order and well written. MDNR's data completeness has historically been good for all pollutants monitored as have been the precision and accuracy (P&A) results for their monitoring.

Section II

AUDIT

An Air Monitoring System Audit of the MDNR was conducted on November 16 and 17, 1999. The purpose of the audit was to document the agency's compliance with the EPA ambient air monitoring regulations. The audit information was obtained from on-site monitor performance audits, agency staff interviews, a review of the most recent year of data in the EPA Aerometric Information and Retrieval System (AIRS), and the agency's performance in the National Performance Audit Program. A copy of the Air Monitoring System Audit Questionnaire is included in the Appendix.

The participants in this audit were:

<u>Name</u>	<u>Agency</u>	<u>Name</u>	<u>Agency</u>
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Jim Long	MDNR	Cheryl Hickman	MDNR
Celeste Koon	MDNR	Ron Stockett	MDNR
Terry Rowles	MDNR	Orel Baker	SPFLD
Jim Beers	MDNR	Carl Barke	SPFLD
Bern Johnson	MDNR	Tom Wiese	SL City
Rick Taylor	MDNR	Larry Eilbott	SL County
Don Gourley	MDNR	Romero Geroche	KCMO
Jim Brunert	MDNR	Huy Tran	KCMO
Robert Nilges	MDNR	Charles Kennedy	KCMO
Assem Abdul	MDNR	Leland Grooms	EPA
Rayna Broadway	MDNR	Mike Davis	EPA
Dennis Scroeder	MDNR	Thien Bui	EPA
Kevin Thoenen	MDNR	James Regehr	EPA

The full cooperation and assistance of these individuals is acknowledged and greatly appreciated.

One-fourth of the agency's monitoring sites were visited. Half of these sites were chosen using National Performance Audit Program results, Data Completeness Report and PARS Report. The other half were randomly chosen. Digital photos of the surrounding area and monitoring stations were recorded at each of the sites. Full site assessments were completed and selected monitor calibrations were audited. The following is a list of the audited monitors and the monitor audit results:

<u>Site Location</u>	<u>Pollutant</u>	<u>Monit. Audit Results</u>
Charleston/Springfield	O ₃	Excellent
Charleston/Springfield	SO ₂	Excellent
Mark Twain State Park	SO ₂	Excellent
Mark Twain State Park	PM _{10(P)}	Satisfactory
Mark Twain State Park	PM _{10(C)}	Satisfactory
Mark Twain State Park	Met.Equip	M Satisfactory
Mark Twain State Park	PM _{2.5}	Satisfactory
Eldorado Springs	NO ₂	Satisfactory
Eldorado Springs	PM _{2.5}	Satisfactory
Liberty	NO ₂	Excellent
Liberty	Met.Equip	Satisfactory
Liberty	O _{3(P)}	Excellent
Liberty	O _{3(C)}	Excellent
St. Joseph Pump Station	PM _{10(P)}	Satisfactory
St. Joseph Pump Station	PM _{10(C)}	Satisfactory

St. Joseph Levee	SO ₂	Satisfactory
St. Joseph Levee	Met.Equip	Satisfactory
St. Joseph Museum	PM _{2.5(P)}	M Satisfactory
St. Joseph Museum	PM _{2.5(C)}	M Satisfactory
Schuylkill West	TSP/Lead	Satisfactory
Watkins Mills	O _{3(P)}	Excellent
Watkins Mills	O _{3(S)}	Excellent
KCMO Troost	SO ₂	Satisfactory
KCMO Locust	PM ₁₀	Satisfactory
KCMO Locust	PM _{2.5(P)}	Satisfactory
KCMO Locust	PM _{2.5(C)}	Satisfactory
KCMO Locust	TSP/Pb _(P)	Satisfactory
KCMO Locust	TSP/Pb _(C)	Satisfactory
KCMO Soho	CO	Excellent
KCMO WOF	SO ₂	Satisfactory
KCMO WOF	NO ₂	Satisfactory
KCMO RG	O _{3(P)}	Excellent
KCMO RG	O _{3(S)}	Excellent
St. Louis City Tucker	NO ₂	Satisfactory
St. Louis City Tucker	SO ₂	Satisfactory
St. Louis City Tucker	O _{3(P)}	Excellent
St. Louis City Tucker	O _{3(S)}	Satisfactory
St. Louis City Margaretta	PM _{2.5}	Satisfactory
St. Louis Co. FloValley	PM _{2.5}	Satisfactory
St. Louis Co. FloValley	CO	Excellent

*_(P) indicates primary monitors

*_(C) indicates collocated monitors

*_(S) indicates secondary monitors

The results of the monitor audits were all satisfactory or better, with the exception of the PM_{2.5} monitors at St. Joseph Museum, which were marginally satisfactory. The regularly scheduled state flow checks performed following the EPA audits indicated that the PM_{2.5} monitors were back within the 4% audit range. Copies of the actual monitor audits are included in the Appendix.

The site assessments were done as per EPA System Audit Guidance and compared each site to the siting criteria found in CFR Part 58, Appendix E. The results of these site assessments was discussed at length during the system audit. MDNR agreed to make all possible improvements and corrections identified by the

site assessments with the help and guidance of EPA, Region 7 air monitoring staff. The assessments for each site can be found in the Appendix.

Section III

AUDIT RESULTS

The technical systems audit focused on the following five areas:

- Network Management
- Field Operations
- Laboratory Operations
- Data and Data Management
- Quality Assurance/Quality Control

These areas were thoroughly reviewed onsite and through the technical systems audit form questionnaire. EPA Region 7 found no major deficiencies in any of these areas.

The current ambient air monitoring network in the state of Missouri (including local agencies) includes: eleven CO, twenty-three Pb, twenty-one O₃, twenty-six PM₁₀, twenty-eight PM_{2.5}, and twenty-six SO₂. A listing of these sites is attached as Appendix D. It is reviewed annually to determine if monitoring locations need to be relocated, added or deleted. These monitors are adequately maintained during one visit every two weeks to each monitoring location.

All of the monitors and laboratory procedures used in the MDNR network have been designated by EPA as approved reference or equivalent methods for ambient air criteria pollutants. Each of the standard materials used to calibrate or audit these monitors or procedures are properly certified. When required, the standard certifications are traceable to NIST reference standards.

MDNR has participated, as required, in EPA's national monitor performance audit program conducting audits of each type of pollutant monitor they operate. Within the past two years the results of these audits have been satisfactory. As shown above, Region 7 conducted several monitor performance audits as part of this program audit. At least one analyzer for each pollutant

monitored by MDNR was audited by Region 7 . The calibration of each audited monitor was satisfactory. Also, the agency's internal monitor performance auditing has been done according to the EPA required schedule. In 1998, the results of these audits were satisfactory.

The completeness of valid data from the MDNR's ambient monitoring network historically has been very good. The quarterly reports of this data to EPA has also been timely. This good record of data completeness continued in 1998, every monitor in the network had more than 75% complete data for each quarter.

Section IV

COMMENDATIONS AND RECOMMENDATIONS

Commendations

- The Missouri Department of Natural Resources, Environmental Services Program (MDNR/ESP) staff are exceptionally well trained and cognizant of field sampling, data processing, and quality assurance protocols. All field and laboratory documentation reviewed were well maintained and easily recoverable by MDNR staff.
- MDNR/ESP has established multiple fail-safe systems to protect the integrity of the ozone monitoring data.
- All monitoring sites that were visited were maintained in good condition and contained all necessary log books and information onsite.
- MDNR continues to monitor, collect, and report five minute average SO₂ data even though no NAAQS exists.
- MDNR/ESP uses an innovative approach to quality assurance of their PM_{2.5} monitoring data by remote verification of site cooperator performance and electronic data review/download through direct modem link to their in-field PM_{2.5} equipment.
- MDNR/ESP maintains independent quality assurance capacity through their Air Quality Assurance Unit (AQAU). The AQAU is unique in its ability to effectively coordinate and perform a large range of monitoring quality assurance

functions across multiple state and local program boundaries.

Recommendations

- Review of Precision / Span / Zero (PSZ) documentation produced by MDNR/ESP monitoring staff do not indicate performance of a follow-on verification with either zero or span gas after monitoring instrument adjustments. Zero and span adjustments must always be followed by a calibration after sufficient time has been allowed for the analyzer to fully stabilize. (Reference: *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II: Part 1, Ambient Air Quality Monitoring Program Quality System Development*, EPA-454-/R-98-004, August 1998, Section 12.5).
- The Bios flow calibrators used by Kansas City, MO air program and the St. Louis Air Pollution program should be sent in for annual recertification.
- Ensure hourly temperature logs are maintained at all monitoring sites.
- Meteorological equipment should be calibrated on a semi-annual basis.
- MDNR/ESP/AQAU maintains excellent procedures for establishing an ambient analyzer's reporting status based upon in-field audits. Currently, no corrective action is recommended if an audited analyzer is within $\pm 15\%$ deviation from any audit point. In many cases $\pm 15\%$ deviation will cause monitoring data to be invalidated. Recommend adoption of tighter control criteria to avoid field data loss due to invalidation. A convenient way to accomplish this would be to require corrective action of any audited monitor receiving a "poor" AQA audit rating in accordance with Section 8.6 of *"Standard Operating Procedures Manual for Environmental Auditing of ambient Air Monitoring Systems"*, MDNR/ESP/AQAU internal SOP.
- Work closely with EPA Region 7 and local agency staff to address siting criteria concerns contained as Appendix B.

MDNR Response

Please see comments attached to response letter.

APPENDIX - Monitoring

National Air Monitoring System Audit Questionnaire

Monitor Audit Results

MDNR Site Assessments

Ambient Air Monitoring Network